

Persistent budget deficits and sustainable external debt: Long-term impact on economic growth in Bangladesh

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Abstract

Debt sustainability is a critical concern in achieving long-term macroeconomic stability, particularly for developing economies like Bangladesh. This study examines the interrelationship between budget deficits, external debt, and economic growth, utilizing annual data from 1980 to 2021. Employing correlation analysis, multiple regression, and principal component analysis, the study identifies a negative association between budget deficits and external debt. Moreover, while external debt exerts a negative influence on economic growth when considered in isolation, its impact becomes positive when combined with stable and supportive policy variables. These findings underscore the significance of comprehensive fiscal management and macroeconomic stability in leveraging external borrowing for growth. The results offer important policy insights: external debt, when guided by prudent and forward-looking strategies, can catalyze development rather than be a constraint. The study emphasizes the need for institutional capacity-building and efficient public investment to ensure debt sustainability in the face of rising repayment obligations.

Keywords: External debt; budget deficit; economic growth; debt sustainability; fiscal policy; Bangladesh

1. Introduction

In an increasingly globalized world, the twin issues of persistent budget deficits and rising external debt have become central concerns for developing economies. Of particular importance is the concept of debt sustainability, which involves adopting fiscal and macroeconomic policies that ensure a country's ability to meet its current and future debt obligations without undermining economic stability or growth prospects (Hakura, 2020). For developing nations, ensuring debt sustainability is crucial as many strive to reduce dependency on external financing and attain self-reliant growth (Górniewicz, 2009). While external borrowing can support infrastructure and development, excessive debt accumulation, especially when driven by persistent fiscal deficits, can adversely affect long-term macroeconomic performance.

Budget deficits often necessitate borrowing, both from domestic and external sources. Governments typically resort to loans to finance expenditure gaps when revenue generation is insufficient. However, when such borrowing becomes routine and repayment capacities are not strengthened, the loans transition into unsustainable debt burdens (Debrun et al., 2019). Over time, these liabilities exert increasing pressure on the macroeconomic framework, raising debt-servicing costs and crowding out other critical public expenditures. Inadequate policy responses may exacerbate the problem, leading to a cycle of borrowing that undermines long-term growth and economic resilience.

Many developing countries, including Bangladesh, face structural challenges such as persistent balance of payments deficits, declining export competitiveness, and limited fiscal space (Tešić et al., 2014). These challenges increase the vulnerability to debt crises, especially when growth falters or revenue projections fall short. To address budgetary imbalances, governments may be compelled to either curtail essential expenditures or introduce new revenue-generating measures, both of which can have significant socio-economic implications. In certain cases, governments resort to printing additional currency, which, while offering short-term liquidity relief, risks long-term inflationary pressures and macroeconomic instability (Al-Qudah & Jaradat, 2018).

Historically, Bangladesh's economy was heavily reliant on foreign aid and concessional loans (MoF, 2020). However, in recent years, deliberate policy interventions and structural reforms have led to notable improvements. These include the strategic utilization of foreign loans, promotion of public-private partnerships, and better debt management practices (MoF, 2022). Nonetheless, as the size of the economy has grown, so too has the volume of public debt, necessitating more sophisticated fiscal management. Despite improved macroeconomic indicators, recurring fiscal deficits continue to add to the national debt stock, raising concerns about long-term sustainability. As observed by Gunter and Rahman (2008), while accelerated growth may increase revenue and reduce unemployment, it may also lead to higher inflation and mounting debt servicing requirements.

Debt sustainability is influenced by a variety of interlinked macroeconomic variables and policy decisions, particularly in developing countries where institutional capacity and economic diversification remain limited (Schöggl et al., 2020). The interplay between budget deficits, external debt, and economic growth is a subject of considerable theoretical and empirical debate. While deficits may be justified during certain economic cycles to stimulate growth, the long-term implications of unchecked borrowing raise critical questions about fiscal discipline and governance (Ahmad & Rahman, 2017). Understanding the limits of sustainable debt and identifying the key determinants of debt accumulation are essential for crafting appropriate fiscal strategies and ensuring resilient economic growth.

Despite various studies addressing the general relationship between fiscal deficits and debt in developing countries, limited empirical evidence exists on how persistent budget deficits impact the long-term debt sustainability and growth trajectory of Bangladesh. This research attempts to fill that gap by examining the structural factors driving external debt accumulation, assessing the optimal debt threshold, and proposing policy measures to manage it efficiently. By focusing on Bangladesh, this study contributes to the broader discourse on fiscal sustainability in emerging economies and aims to support evidence-based policymaking in the face of evolving macroeconomic challenges.

To stimulate economic growth, developing countries generally prepare a deficit budget. In Bangladesh, there are more opportunities for empirical studies about the challenges and consequences of budget deficits and external debt. However, the question remains: What are the long-term implications of persistent budget deficits and external debt on sustainable economic growth in Bangladesh, and how effective are macroeconomic policy tools in addressing these challenges? Keeping this question in mind, the primary purpose of this study is to identify the challenges and consequences of external debt and assess the effectiveness of macroeconomic policy tools. The specific objectives of this study are

- To examine the current state of the budget deficit and external debt in Bangladesh;
- To determine the nature of the relationship between external debt and budget deficits in Bangladesh;
- To evaluate the key challenges to ensuring the sustainability of external debt in Bangladesh; and
- To find the role of debt on enhanced and sustainable economic development in Bangladesh.

2. Literature Review

External debt and budget deficit are persistent macroeconomic concerns for both developed and developing nations. Numerous studies have explored their causes and consequences, with

findings often varying based on region, period, and methodological approach. This study specifically investigates the challenges of budget deficits and the sustainability of external public debt in Bangladesh. Research conducted in other regions highlights relevant dynamics; for instance, Jayaraman and Lau (2009) in the Pacific and Butts (2009) in Latin American and Caribbean countries confirmed a measurable association between external public debt and economic growth, suggesting the importance of prudent debt management for macroeconomic performance.

The literature further highlights the structural roots of fiscal imbalance. Agarwal (2014) noted that fiscal deficits typically arise from a mismatch between public expenditures and tax revenues. Qayyum et al. (2014) warned that external debt can pose substantial burdens on an economy and jeopardize its stability. Osinubi and Olaleru (2006) addressed the debt overhang problem and proposed an optimal external debt ratio to maximize the benefits of borrowing while maintaining macroeconomic stability. Focusing on Jordan, Abdelhadi (2013) found a significant negative relationship between external debt and economic growth, pointing out that a large share of the balance of payments is often allocated to debt servicing. In similar contexts, Alam and Taib (2013) reported a positive relationship between external debt and fiscal deficit, whereas Al-Refai (2015) identified a positive link between domestic debt and economic growth. Shahateet et al. (2014), applying Granger causality tests, found no clear directional causality between budget deficit and debt, suggesting the relationship might be influenced by external factors. Al-Qudah and Jaradat (2018) examined the long-run dynamics and confirmed a connection among external debt, budget deficit, and growth. In contrast, Shihab (2014) discovered a unidirectional causality running from budget deficit to economic growth. Tung (2018) demonstrated that fiscal deficits tend to negatively affect gross output and private investment over both the short and long run.

More recent empirical findings remain mixed. Manasseh et al. (2022) found a significant negative relationship between external debt and growth in developing countries. In the context of Bangladesh, Saima and Uddin (2017) identified a unidirectional long-run causality from public debt to the budget deficit. Similarly, Tajammal and Butt (2024) find a consistently negative impact of external debt on growth in Bangladesh and Sri Lanka, with the latter experiencing stronger adverse effects due to higher debt service ratios and weaker fiscal institutions. Farhana and Chowdhury (2014) revealed a negative relationship between foreign debt and GDP growth, but a positive association between investment and growth. Hussain and Haque (2017), using two distinct datasets, reported conflicting results—one indicating a positive and the other a negative long-run relationship between budget deficit and economic growth. Rahman et al. (2012), applying Granger causality tests, found bidirectional causality between GDP and external debt. Saifuddin (2016) observed a positive link between public debt, investment, and growth. However, multiple studies—including those by Hassan and Akhter (2014), Yeasmin et al. (2015), and Makun (2021)—consistently reported a negative impact of debt on GDP. Akhter and

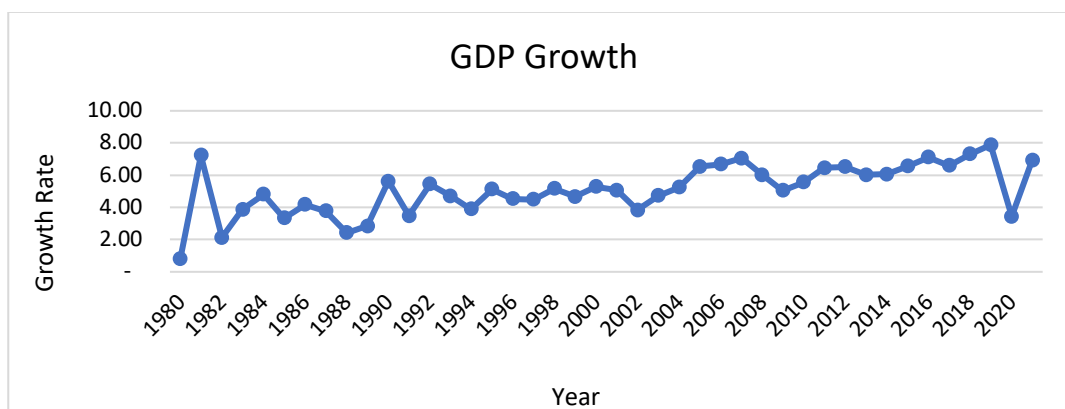
Hassan (2012) further indicated that although external debt negatively affects GDP, it positively influences investment and government reserves, suggesting a complex and context-dependent effect.

Despite the extensive literature, empirical evidence remains inconclusive and highly context-specific. Variations in results are often attributable to differences in estimation techniques, periods, model specifications, and variable selections. A majority of studies on Bangladesh suggest a negative impact of external debt on growth, although others—including Saifuddin (2016), Edo et al. (2020), Silva (2020), Mohsin et al. (2021), and Joshua et al. (2021)—found a positive influence of external debt under certain conditions. Dey and Tareque (2020) emphasized the potential of sound macroeconomic policies to offset the negative consequences of debt, arguing that fiscal sustainability can be supported through coordinated monetary measures. Meanwhile, Hassan and Meyer (2021) underlined the role of institutional quality in mediating the effects of debt on growth. Given these varied outcomes, it remains essential to revisit the relationship among external debt, budget deficit, and economic growth, particularly in the context of Bangladesh's evolving fiscal landscape.

2.1 Growth, deficit, and debt scenario of Bangladesh

To understand the current state of the budget deficit and external debt in Bangladesh, this study examines historical trends of several key macroeconomic indicators—namely, GDP growth, the exchange rate, external debt stocks as a percentage of GDP, and the budget deficit-to-GDP ratio. These variables are crucial for assessing debt sustainability and the country's broader macroeconomic stability.

Figure 1: The growth rate of gross domestic product (GDP)

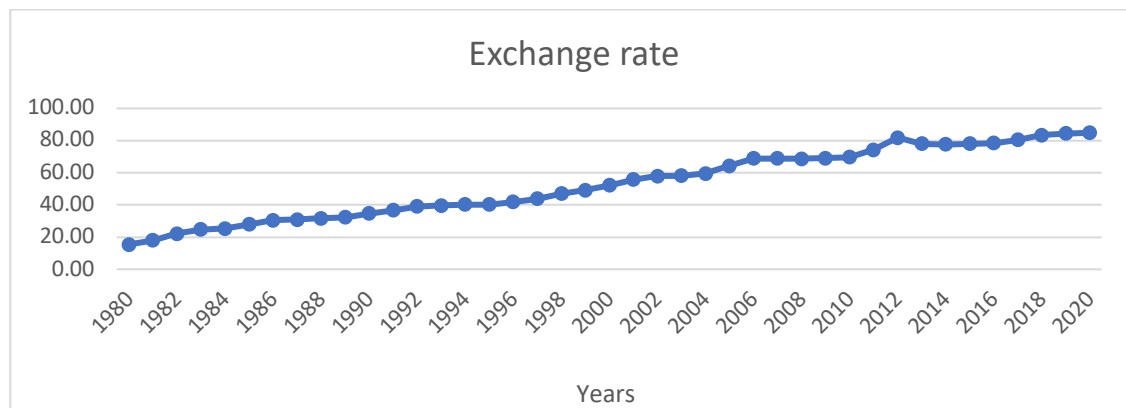


* Calculated and graphed by the authors.

** Data Source: World Development Indicators of the World Bank

Figures 1 and 2 illustrate the historical trends in GDP growth and the exchange rate of the Bangladeshi Taka (BDT) from 1980 to 2021. While GDP growth has experienced periodic volatility, particularly during times of global or domestic shocks, the long-term trajectory has been upward, reflecting economic resilience and structural transformation. Notably, post-2000s growth has been more robust and consistent, largely driven by export-oriented manufacturing, remittances, and infrastructure investments.

Figure 2: The exchange rate of BDT with USD

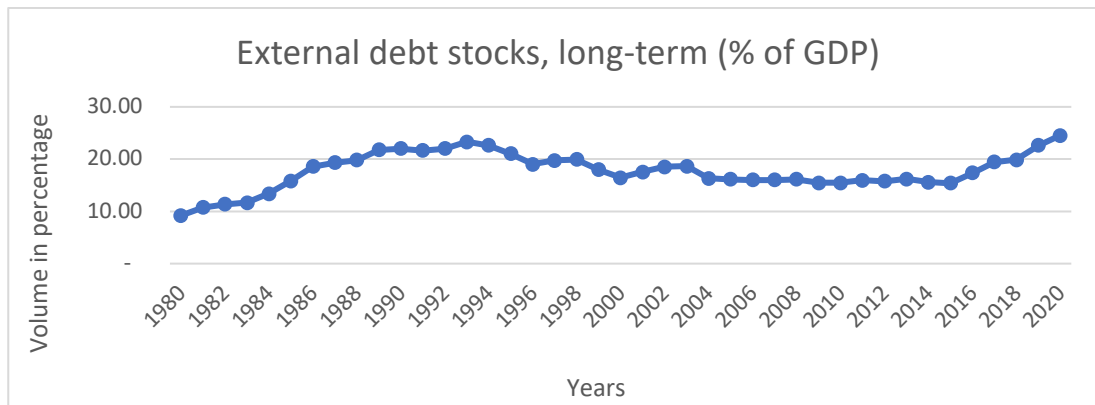


* Calculated and graphed by the authors.

** Data Source: Bangladesh Bank, the Central Bank of Bangladesh

Conversely, the exchange rate shows a clear and consistent depreciation of the BDT against the USD, from 15.45 BDT/USD in 1980 to 86.43 BDT/USD in 2021. This trend reflects long-term inflation differentials, a widening current account deficit at times, and structural changes in the external sector. Although currency depreciation can improve export competitiveness, it also raises the cost of servicing external debt and imports, with potential inflationary implications. The sustainability of debt depends on the difference between the overall debt scenario, including external debt, and the growth rate of real GDP. Theoretically, the budget deficit has a direct relationship with the debt.

Figure 3: External debt stocks as a percentage of GDP

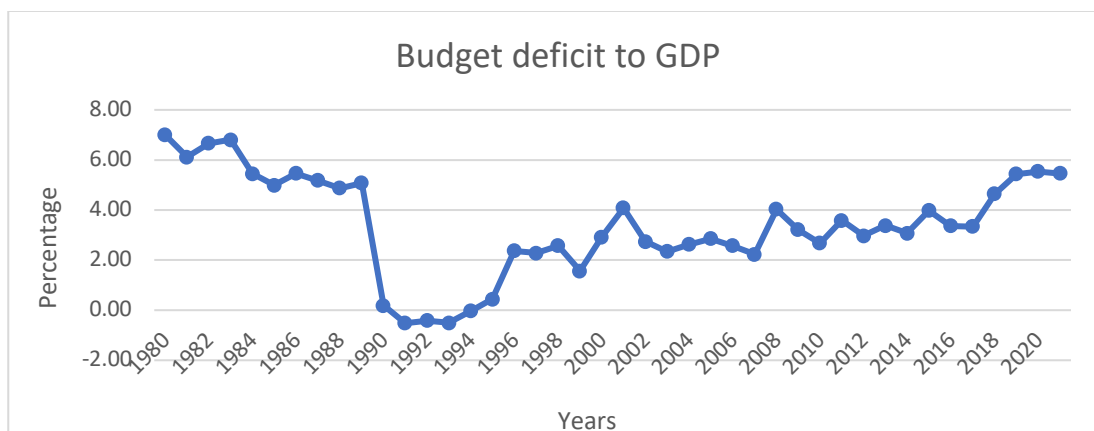


* Calculated and graphed by the authors.

** Data Source: World Development Indicators of the World Bank

Figures 3 and 4 focus on the fiscal dimension. External debt as a percentage of GDP remained relatively stable for much of the period but rose sharply after 2015. This uptick corresponds with increased foreign borrowing to finance major infrastructure projects and budgetary support, raising concerns about future debt servicing burdens. If this trajectory continues without a corresponding rise in export earnings or fiscal revenue, the country's debt sustainability could be at risk.

Figure 4: The ratio of the budget deficit and GDP



* Calculated and graphed by the authors.

** Data Source: World Development Indicators of the World Bank and Bangladesh

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The budget deficit-to-GDP ratio, meanwhile, displays cyclical fluctuations but remains within a relatively narrow band over time. This stability may reflect consistent fiscal management, yet the deficit's persistence, despite strong growth, signals structural weaknesses in revenue mobilization. If deficits are increasingly financed by external borrowing, it could exacerbate the debt burden. The combination of rising external debt and a depreciating currency warrants close monitoring, particularly in a global context marked by tightening financial conditions and exchange rate volatility. While sustained GDP growth provides some buffer, reliance on external financing for fiscal deficits introduces vulnerabilities. A stronger fiscal consolidation strategy and greater export diversification will be critical for long-term debt sustainability.

3. Methodology

3.1 Data collection

The study focuses on Bangladesh, primarily using secondary data sources. Data from 1980 to 2021 were mainly obtained from the IMF's World Economic Outlook and the World Bank's World Development Indicators. Additionally, supporting data were collected from published articles by the Bangladesh Bank and the Bangladesh Economic Review. The time series data for 1980 to 2021 include eleven variables: Real GDP, external debt to GDP ratio (EDG), budget deficit to GDP ratio (BDG), inflation, interest rate, exchange rate, trade openness (TO), export growth, population, gross enrollment ratio (tertiary), and investment to GDP ratio (ING).

Using macroeconomic data from 1980 to 2021 for Bangladesh is well justified based on both empirical and contextual reasons. The year 1980 marks the start of a more stable phase in the country's economic history, following the immediate post-independence reconstruction period of the 1970s. During this time, Bangladesh began implementing significant economic reforms, including trade liberalization, financial sector restructuring, and fiscal policy changes. Most importantly, macroeconomic data from this period onward is more consistent, reliable, and easily accessible from sources like the Bangladesh Bureau of Statistics (BBS), Bangladesh Bank, the World Bank, and the IMF. This timeframe covers over four decades of economic performance, enabling the analysis of long-term trends, policy effects, and major events, such as the liberalization of the 1990s, export-led growth in the 2000s, and the economic shock caused by the COVID-19 pandemic in 2020–2021. Moreover, this period matches the data range commonly used in existing studies, ensuring comparability and increasing the credibility of the analysis.

3.2 Analytical techniques

The examination of the current budget deficit and external debt with sustainability by nature can be expressed using descriptive statistics with the help of existing literature. They can be judged by to debt-to-GDP ratio, the level of per capita debt, and the debt servicing. Although Bangladesh never defaulted or even rescheduled the debt in the past, there will always be a risk

of defaulting as the debt rises over time. The analytical framework incorporates four core econometric techniques: correlation analysis, multiple linear regression, Principal Component Analysis (PCA), and Principal Component Regression (PCR), allowing for both direct and composite interpretations of variable interactions. The relationship between budget deficit and external debt, and the role of debt in the enhancement of economic growth, can be seen from the results of correlation and regression analysis. To reduce multicollinearity and assess the combined effects of variables, Principal Component Analysis (PCA) is conducted. This method transforms correlated explanatory variables into a set of uncorrelated components, preserving as much variance as possible. The component scores are then used in a regression framework to evaluate the net effect of policy and fiscal factors on economic growth. The use of these techniques allows the study to explore both the individual and combined effects of budget deficits and external debt on economic performance while addressing endogeneity and multicollinearity concerns.

To evaluate the role of budget deficit and external debt on economic growth, this study assumes real GDP, external debt, and budget deficit as its main variables. To avoid any specification bias, the population has been taken as a control variable. However, a few more variables, namely, inflation, exports, exchange rate, investment, and interest rate, are also included in the model. All the data were organized and analyzed using SPSS.

3.3 Model specification

At first, the study will conduct an augmented Dickey-Fuller test to test the non-stationarity of the time series data. To determine the influence of budget deficit on external debt, the study will use correlation analysis and two regression models; firstly, it will take external debt stocks as the dependent variable and the budget deficit as the independent variable. Secondly, it will take external debt stocks as dependent variables and budget deficit, inflation, exports, exchange rate, population, investment, and interest rate as independent variables. To find out the challenge of sustainable external debt, the study will use correlation analysis and a regression model where it will take real GDP as the dependent variable and external debt stocks, budget deficit, inflation, exports, exchange rate, population, investment, and interest rate as independent variables. With the help of descriptive statistics, the study will then try to find out the current debt scenario and the strength of the economy.

There are different methodologies to determine the combined impact of different variables or to construct the indices. The principal component analysis (PCA) is one of them, and this study will use it to determine the combined impact. Principal Component Analysis (PCA) was selected as the dimensionality reduction technique in this study due to its suitability for addressing multicollinearity among macroeconomic variables such as budget deficit, external debt, and related fiscal indicators. These variables are often highly correlated, which can distort standard regression estimates. PCA transforms the original correlated variables into a set of orthogonal

(uncorrelated) components, preserving as much of the original variance as possible. This allows for the inclusion of composite measures in the regression framework without sacrificing interpretability or statistical reliability. Unlike more complex or non-linear dimensionality reduction techniques such as t-SNE or autoencoders, PCA is computationally efficient, transparent, and widely used in econometric research. It produces linear combinations of the original variables, making it ideal for subsequent regression analysis and policy interpretation. Furthermore, PCA's long-standing application in macroeconomic modeling, such as in factor models or composite index construction, makes it a theoretically grounded and methodologically appropriate choice for this study.

The functional form of the model is as follows:

$$RGDP_t = f(EDS_t, BDG_t, INV_t, INF_t, INT_t, EXP_t, EXR_t, PLN_t)$$

The focus of the study will be on the dependent variable, real gross domestic product (RGDP), and our main variable, external debt stocks (EDS). The growth of the economy largely depends on fiscal policy; this study includes the budget deficit to growth ratio (BDG), which may hurt growth, and investment (INV), which stimulates growth. Economic stability largely depends on the steady price level, and the study includes inflation (INF) and interest rate (INT) to represent the purchasing power of the residents. In the world of globalization, countries need to have trade relationships with each other; so, the study takes exports (EXP) as the measure of trade openness, and exchange rates (EXR) as the measure of the strength of the currency.

A labor-intensive economy like Bangladesh demands population (PLN) to be included as a control variable, and the study does it to account for the scale effects and demographic influences on economic growth. In macroeconomic analysis, countries with larger populations may exhibit higher levels of public expenditure, borrowing needs, and debt servicing requirements simply due to the demand for broader infrastructure, healthcare, and education services. Controlling for population allows the analysis to isolate the effects of fiscal variables, such as budget deficit and external debt, on economic growth, independent of the size of the country. This helps ensure that observed relationships are not confounded by population-driven differences in economic activity or government fiscal behavior.

4. Results and Discussion

4.1 Influence of budget deficit on external debt

To examine the relationship between the budget deficit and external debt in Bangladesh, this study employed a time series econometric approach. The Augmented Dickey-Fuller (ADF) test was first applied to ensure the stationarity of all variables. Results confirm that all variables are stationary at the 10% level of significance, validating their suitability for regression and principal

component analysis. All variables were expressed in percentage terms (e.g., external debt as a percentage of GNI, budget deficit as a percentage of GDP), while no logarithmic transformation was applied, as stationarity was achieved in levels. The correlation analysis reveals a statistically significant negative relationship between the budget deficit and external debt, with a correlation coefficient of -0.496. This suggests that, contrary to conventional expectations, higher budget deficits in Bangladesh have historically been associated with lower external debt accumulation. Such a counterintuitive result may reflect Bangladesh's tendency to finance budget deficits primarily through domestic borrowing or concessional aid, rather than commercial external loans. The multiple linear regression analysis provided further insight. The multiple regression equation is:

$$EDS = 49.8 - 0.934BDG - 0.274INF + 0.132INT - 0.258EXR + 0.008EXP + 0.578PLN - 3.251INV$$

The model explains 93.1% of the variation in external debt stocks ($R^2 = 0.931$), indicating a very good fit. The F-statistic value of 63.2 is statistically significant, confirming the joint explanatory power of the independent variables. The Durbin-Watson statistic of 1.25, however, suggests moderate positive autocorrelation, warranting caution in interpreting time-dependent residuals. This may reflect persistent trends in fiscal or macroeconomic policy over time. In a bivariate regression with only the budget deficit as the independent variable, only 24.6% of the variation in external debt stocks is explained, highlighting the importance of including additional macroeconomic controls. Among the predictors in the multivariate regression, only budget deficit, population, and investment were statistically significant at conventional levels.

The negative coefficient of the budget deficit (-0.934) implies that a one percentage point increase in the budget deficit is associated with a 0.93 percentage point decline in external debt, holding other variables constant. This suggests that Bangladesh may have relied more heavily on domestic borrowing or alternative sources during deficit periods. Policymakers should evaluate the sustainability of such financing patterns and assess whether domestic borrowing may crowd out private investment. Moreover, the significant negative effect of investment and the positive influence of population growth highlight structural macroeconomic challenges. Rising population pressure may increase fiscal demand, while low investment may limit future growth and the capacity to manage debt sustainably. These trends call for coordinated policy actions that balance fiscal discipline, debt management, and inclusive growth strategies.

4.2 Challenges of sustainable external debt

The sustainability of external debt may be categorized into short-term and long-term. The short-term sustainability depends on the government's fiscal or budgetary policies that target excessive growth of indebtedness, and the long-term sustainability depends on the impact of the government's budget scenario and the intention to repay the loans (Câmpeanu, 2008). The

success of the budgetary policy hinges on its size and the growth rate of the GNP, and the speedy growth tolerates a larger deficit. It is generally known that larger government spending than revenue creates a budget deficit, and the deficits push the national debt further. The economy may become subverted as the debt-to-GNP ratio swells by the rise of debt faster than the growth of gross national product. So, whether the given policies are sustainable or not can be resolved by doing comprehensive prognoses of the imminent course of the debt-to-GNP ratio. Thus, the task of the government is to determine policies that fulfill the long-term macroeconomic goals with a constant debt level that ensures the stability of the economy. To empirically examine the relationship between external debt and macroeconomic performance, a correlation matrix was constructed to analyze the association between real GDP (RGDP) and other key variables (Table 1). These include external debt stocks (EDS), budget deficit (BDG), inflation (INF), interest rate (INT), exchange rate (EXR), exports (EXP), population (PLN), and investment (INV).

Table 1: The correlation matrix of real GDP with other variables

	EDS	BDG	INF	INT	EXR	EXP	PLN	INV
RGDP	-0.691	-0.074	-0.430	0.141	0.988	-0.369	0.985	0.973
Sig. (1-tailed)	0.000	0.323	0.002	0.189	0.000	0.009	0.000	0.000

The matrix shows that real GDP is negatively correlated with external debt (−0.691), inflation (−0.430), and exports (−0.369), while it is positively correlated with the exchange rate (0.988), population (0.985), and investment (0.973). Budget deficit and interest rate exhibit weak and statistically insignificant correlations with real GDP. These results have important policy implications. For instance, the strong negative correlation between external debt and GDP suggests that higher debt levels may be associated with lower output, possibly due to debt overhang effects or inefficient use of borrowed funds. On the other hand, the positive correlation between GDP and investment or population points to the importance of productive capacity and demographic scale in driving economic growth. However, correlation analysis is inherently limited in establishing causality. To further analyze these relationships, a multiple regression was run with RGDP as the dependent variable. The resulting equation is:

$$RGDP = 22.92 - 0.004EDS + 0.015BDG + 0.003INF - 0.002INT + 0.008EXR - 0.002EXP + 0.016PLN - 0.005INV$$

The regression model explains 78.5% of the variation in real GDP ($R^2 = 0.785$), with an F-statistic of 269.32, indicating the joint significance of the explanatory variables. The Durbin-Watson statistic is 0.222, signaling strong positive autocorrelation, which may undermine the reliability of the OLS estimates and suggests that further diagnostics are warranted. Interestingly,

among all the independent variables, only population was found to have a statistically significant effect on real GDP in the multivariate regression. This suggests potential multicollinearity among explanatory variables, especially given the very high correlations between population, investment, and exchange rate. The key concern for Bangladesh is whether its external debt is becoming structurally embedded and thus increasingly difficult to manage. Given structural constraints in domestic revenue mobilization and underdeveloped financial markets, Bangladesh, like many developing countries, relies heavily on external sources to finance fiscal gaps. While concessional borrowing has historically moderated repayment pressures, the increasing share of semi-concessional and non-concessional borrowing poses future risks. From a historical perspective, Bangladesh's external debt-to-GDP ratio has increased from 8.88% in 1980 to 24.55% in 2021 (see Figure 3). Although this level remains moderate by international standards, the upward trend and rising debt servicing costs warrant attention. If the debt grows faster than GDP in the coming years, especially amid global interest rate volatility and exchange rate depreciation, sustainability may be at risk.

Ultimately, fiscal consolidation, enhanced domestic resource mobilization, and growth-enhancing investments are needed to stabilize the debt path. Thus, for developing countries, it is very important to know the appropriate level of debt and its proper use. Ensuring that borrowed funds are allocated to productive sectors that generate sufficient returns is critical for sustaining long-term growth without jeopardizing fiscal solvency.

4.3 Role of debt on economic development in Bangladesh

To explore the multifaceted influence of external debt and related macroeconomic variables on economic development in Bangladesh, this study employs Principal Component Analysis (PCA) followed by regression analysis. PCA is particularly suitable in this context because several explanatory variables exhibit intercorrelations, potentially leading to multicollinearity in standard regression models. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy yields a value of 0.758, and Bartlett's Test of Sphericity is statistically significant, indicating that the variables are sufficiently correlated to justify PCA. Three principal components were extracted using the eigenvalue criterion (>1), and their cumulative explained variance is 87.2%, indicating that these components adequately represent the underlying data structure. The component matrix reveals the following groupings:

- **Component 1 – Structural and External Drivers:** This includes investment, exchange rate, population, gross enrollment ratio, trade openness, and external debt stocks. These variables reflect a blend of structural capacity, demographic momentum, and external sector engagement.

- Component 2 – Fiscal-Monetary Policy Indicators: This consists of budget deficit, interest rate, and inflation, reflecting the stance and stability of macroeconomic management.
- Component 3 – Export Dynamics: This includes only export growth, suggesting it behaves independently in its influence on the economy.

To examine the influence of these components on real GDP, both Pearson correlation and regression analysis were applied. The correlation matrix shows that Component 1 is strongly and positively correlated with real GDP ($r = 0.955$), while Components 2 and 3 show weaker or mixed correlations. The regression model, using real GDP as the dependent variable and the three components as independent variables, yields the following equation:

$$RGDP = 25.209 + 0.575COMP_1 + 0.066COMP_2 - 0.139COMP_3$$

The model explains 99.7% of the variation in real GDP ($R^2 = 0.997$), with an F-statistic of 532.35, indicating very high explanatory power. However, the Durbin-Watson statistic is 0.490, suggesting the presence of strong positive autocorrelation. This serial correlation may inflate the R^2 and lead to inefficient estimates; future robustness checks are warranted. The regression results offer several insights into the economic role of external debt within a broader macroeconomic context:

- Component 1 (structural and external drivers) has a significant positive impact on real GDP. This implies that external debt, when combined with robust investment, demographic strength, trade openness, and human capital (proxied by enrollment ratio), contributes positively to economic development. However, within this component, external debt exhibits a negative loading, suggesting that its effect on growth is conditional; it may be detrimental in isolation, but is outweighed by the positive effects of the other bundled variables. This underscores the importance of the productive utilization of external debt in growth-oriented sectors.
- Component 2, capturing fiscal and monetary policy conditions, has a small and statistically weak positive coefficient. This suggests that short-run policy instruments, such as interest rate adjustments or fiscal deficits, may not independently drive growth unless they are aligned with long-term structural strategies.
- Component 3 (export growth) has a negative coefficient, which is counterintuitive. This may reflect volatility in export performance or overdependence on a narrow range of export items, such as RMG (ready-made garments), which could be vulnerable to global shocks and not sufficiently value-added. This indicates the need for export diversification and deeper integration into global value chains.

The results highlight that external debt plays an indirect but nuanced role in economic development. Its adverse standalone effect can be mitigated or reversed when complemented by investments in physical capital, education, and trade openness. For external debt to become a catalyst rather than a constraint, policy coordination is essential. Borrowed funds must be directed toward sectors that expand productive capacity and improve long-term economic fundamentals.

4.4 Discussion

This study reveals important dynamics between budget deficits, external debt, and economic growth in Bangladesh. It finds a negative relationship between budget deficit and external debt, and population growth has a positive impact on external debt. Conceivably, the budget deficit may not be the only cause of increased external debt but rather some other factors. It opens the door for future researchers to find out the exact cause of increased external debt. The main finding of this study is that it reveals how the budget deficit and external debt influence economic growth, considering economic policy. It appears that, individually, external debt hurts economic growth, but when combined with other relevant variables, the effect turns positive. Other studies with a similar focus, looking only at external debt, found a negative relationship between external debt and economic growth. However, in this study, the estimated component matrix shows a positive and significant impact on economic growth, indicating that stable policy variables contribute to higher economic growth. Since external debt is often unavoidable, the key is how it can be used most effectively to minimize its negative effects. Notably, external debt alone tends to hurt economic growth; however, when analyzed alongside stable and supportive policy variables, its effect can turn positive. This suggests that the detrimental effects of debt can be mitigated when complemented by sound fiscal management and appropriate macroeconomic frameworks. Therefore, the relationship between debt and growth is not inherently fixed but contingent upon the broader policy environment. Future research could explore the specific policy combinations that most effectively transform external debt into a driver of inclusive and resilient growth.

5. Conclusion and Recommendations

If the real interest rate on debt exceeds the growth rate, it becomes impossible for the government to run a permanent primary deficit. If the growth rate fails to supersede the real interest rate in an economy, the ratio between debt and gross domestic product will rise continuously. As the rise continues, it may not be possible for the government to sell its debt, and the government will be forced to cut its expenses to reduce its budget deficit. Thus, as a large portion of a country's income goes to repay foreign loans, the repayment amount should not be increased in a manner that becomes unmanageable for the governments. To ensure debt

sustainability and minimize fiscal vulnerability, policymakers must focus on aligning debt utilization with productive investments that stimulate long-term growth. Rather than solely targeting reductions in debt or deficits, strategic emphasis should be placed on strengthening institutional capacity, improving public investment efficiency, and maintaining a stable macroeconomic climate. Additionally, borrowing decisions should be made within the context of real interest rates and projected growth rates, ensuring that debt servicing remains manageable. A prudent debt management strategy, guided by comprehensive and forward-looking fiscal policies, is essential to balancing development needs with fiscal discipline.

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